

Patent Claims:

1. Device for monitoring the position and movement of a brake pedal, comprising a master cylinder (1; 102) with an integrated position generator for monitoring the position of a displaceable piston (2, 3; 105, 106) within a housing (6; 103) for use in a controlled brake system for motor vehicles, in particular with driving dynamics control, and the position generator includes a magnet (35; 150) as a signal transmitter which transmits a magnetic field in the direction of a sensor element (36; 151) being stationary on the housing (6, 103), and is connectable to an electronic control unit, c h a r a c t e r i z e d in that the magnet (35; 150) is arranged between two pistons (2, 3; 105, 106) and is displaceable in relation to at least one of the pistons (2, 3; 105, 106).
2. Device as claimed in claim 1, c h a r a c t e r i z e d in that at least two spring means are provided, by way of which the magnet (35; 150) is retained between the pistons (2, 3; 105, 106) and is arranged so as to be displaceable in relation to at least one of the pistons (2, 3; 105, 106).
3. Device as claimed in claim 2, c h a r a c t e r i z e d in that the spring means comprise a resetting spring (14; 133) supported on the first piston (2; 105) and an additional spring means (42; 157; 166; 189) supported on the magnet (35; 150),

with the additional spring means (42; 157; 166; 189) showing a higher degree of resiliency than the resetting spring (14; 133).

4. Device as claimed in claim 3,  
c h a r a c t e r i z e d in that the sensor element (36; 151) comprises at least one Hall sensor.
5. Device as claimed in claim 3 or 4,  
c h a r a c t e r i z e d in that the piston (3; 106) includes a means for guiding the magnet (35; 150).
6. Device as claimed in claim 5,  
c h a r a c t e r i z e d in that the piston (3; 106) has a peg-shaped piston portion (34; 147) to guide the magnet (35; 150).
7. Device as claimed in claim 6,  
c h a r a c t e r i z e d in that a support member (39; 50; 154; 165) made of a non-magnetic material is arranged between the magnet (35; 150) and the piston portion (34; 147), and in that the magnet (35; 150) is interposed in an axial direction between plates (37, 38; 152, 153) made of an iron material.
8. Device as claimed in claim 7,  
c h a r a c t e r i z e d in that the support member (39; 50; 154; 165) has a one-part and substantially cylindrical design.

9. Device as claimed in claim 8,  
c h a r a c t e r i z e d in that the support member (39; 154) has a bead (40; 155) for the axial abutment of the magnet (35; 150), and a stop (41; 156) is provided at the piston portion (34, 147) for limiting the relative displacement travel of the support member (39; 154) with respect to the piston (3; 106), with the additional spring means (42; 157) being supported on the piston (3; 106).
10. Device as claimed in claim 9,  
c h a r a c t e r i z e d in that the resetting spring (14) is arranged at least partly within a bowl-shaped wall (24) of the piston (2) and is centrally penetrated by a peg (26) with a stop (30) on which a sleeve (22) is fixed in position in such a fashion that, upon displacement of the piston (2) during actuation, the means for guiding the magnet (35) plunges axially and telescopically into the interior of the sleeve (22).
11. Device as claimed in claim 8,  
c h a r a c t e r i z e d in that the support member (165) includes a first cylindrical portion (167) and a second cylindrical portion (168), and the magnet (150) is arranged on the second cylindrical portion (168) of the support member (165), while the support member (165) with its second cylindrical portion (168) is guided on the piston portion (147) of the second piston (106).

12. Device as claimed in claim 11,  
c h a r a c t e r i z e d in that the support member (165) has projections (169) which point radially inwards and, as a guide and rotation-prevention mechanism of the support member (165), engage into recesses (170) of the second piston portion (147).
13. Device as claimed in claim 7,  
c h a r a c t e r i z e d in that the support member (165) has a multi-part design and includes a spring sleeve (177) and a magnet sleeve (178), and the spring sleeve (177) includes radially outwards pointing projections (181) being arranged between radially inwards pointing projections (184, 185) of the magnet sleeve (178) for the connection with the magnet sleeve (178), with said projections (181, 184, 185), as a guide and a rotation-prevention mechanism of the support member (165) on the piston portion (147), engaging into recesses (170) of the second piston portion (147), and with the magnet (150) being arranged on the magnet sleeve (178).
14. Device as claimed in any one of claims 3 to 13,  
c h a r a c t e r i z e d in that the resetting spring (14; 133) and the additional spring means (42; 166; 189) are joined in an elastically biased manner by means of a cage (51; 145) in such a fashion that displacement of the piston (2; 105) during actuation allows compression of the resetting spring (14; 133) and expansion of the additional spring means (42; 166; 189) in order to render possible a proportional

relative displacement of the magnet (35; 150) in relation to the piston (2; 105).

15. Device as claimed in claim 14,  
c h a r a c t e r i z e d in that the cage (51) includes a sleeve for the mounting support of the magnet (35) and a spring accommodation (52) which is arranged thereon so as to be displaceable within limits and is acted upon by resetting spring (14) and spring means (42), which spring accommodation, when the piston (2) is displaced during actuation, is movable into abutment on the piston (3) in such a fashion that sleeve and magnet (35) are displaced in the actuating direction (A) in relation to the piston (3) by way of expansion of the spring means (42).
16. Device as claimed in claim 14,  
c h a r a c t e r i z e d in that the cage (145) has a first sleeve (137) and a second sleeve (164; 187) for preloading the resetting spring (133) and a support member (165; 188), wherein upon displacement of the piston (105) during actuation the magnet (150) is displaced in relation to the piston (106) in the actuating direction (A) by way of expansion of the additional spring means (166; 189).
17. Device as claimed in claim 16,  
c h a r a c t e r i z e d in that the magnet (150) is guided and arranged on the second sleeve (187), and the support member (188) has projections (196) pointing radially outwards and being guided in recesses (193) of the second sleeve (187).

18. Device as claimed in claim 17,  
c h a r a c t e r i z e d in that the magnet (150) is  
interposed in an axial direction between plates (152,  
153) made of an iron material which include radially  
inwards pointing projections (197) and webs (198) that  
are guided in the recesses (193) of the second sleeve  
(187).
19. Device as claimed in claim 18,  
c h a r a c t e r i z e d in that the second sleeve  
(187) has a step (200) on an inside surface (199), and  
the additional spring means (189) is arranged between  
the step (200) and the plate (153) in a biased manner.
20. Device as claimed in claim 18,  
c h a r a c t e r i z e d in that an additional  
spring means is interposed in a biased manner between  
the first sleeve and the support member.
21. Device as claimed in any one of the preceding claims 1  
to 20,  
c h a r a c t e r i z e d in that the sensor element  
(36; 151) is arranged in an accommodation (60) that can  
be fixed in a defined position on the housing (6; 103).
22. Device as claimed in claim 21,  
c h a r a c t e r i z e d in that the sensor element  
(36; 151) along with rigid conductor elements is  
received in the accommodation (60) in a form-locking  
manner, and in that an electric connecting line (61)

can be slipped into a plug device (62) of the accommodation (60).

23. Device as claimed in claim 21 or 22,  
c h a r a c t e r i z e d in that the accommodation (60) is adjustable in the actuating direction (A) of the piston (2, 3; 105, 106) and in relation to the housing (6; 103) and can be fixed in a defined position.
24. Device as claimed in any one of claims 21, 22 or 23,  
c h a r a c t e r i z e d in that the housing (6; 103) has a stop (63) for the accommodation (60), and in that at least one spacer element (64) is arranged between stop (63) and accommodation (60) for providing a defined positioning of the sensor element (36).
25. Device as claimed in any one or more of the preceding claims 21 to 24,  
c h a r a c t e r i z e d in that the accommodation (60) is arranged between two pressure fluid reservoir ports (65, 66).
26. Device as claimed in any one or more of the preceding claims 21 to 25,  
c h a r a c t e r i z e d in that the accommodation (60) is arranged at a housing end.